

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Such *et al.*

Serial No.: 10/587,653

Filed: 27 January, 2005

Title: **Initiating system for solid  
polyester granule manufacture**

Confirmation No.:

Art Unit:

Examiner:

Atty. Docket:

**Declaration of  
Under 37 C.F.R. § 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

1. I, the undersigned, **Algirdas Kazimieras Serelis** declare as follows:

**My Background and Experience**

2. I am a Senior Research Specialist in the Research and Development laboratory of Dulux Australia Pty Ltd.
3. A copy of my curriculum vitae is attached hereto as Exhibit 1. From my curriculum vitae you will see that I have a Bachelor's degree with Honours in Chemistry, and a Doctorate in Organic Chemistry (synthetic and mechanistic) from The University of Adelaide. Postdoctoral studies at The State University of New York at Buffalo (1975-1977, natural product synthesis) and The University of Adelaide (1978-1980, free radical chemistry) followed, leading to employment as a Research/Senior Research Scientist at The Commonwealth Scientific and Industrial Research Organization (CSIRO) Division of Applied Organic Chemistry (1980-1987, mechanisms of free radical polymerization, insecticide synthesis), then as a Senior Research Fellow at Monash University (1987-1990, synthetic chemistry). Since 1990 I have been employed in the Research and Development laboratories of Dulux Australia conducting research into different aspects of the fundamental free radical reactions, primarily in the context of emulsion and suspension polymerizations, used in making polymers for uses related to the coatings industry.

4. During the course of my scientific career I have spent extended periods in the study of the mechanisms of generation and reactions of free radicals, and the mechanisms of important processes in free radical polymerization (initiation, termination, propagation, chain transfer), that operate during emulsion and suspension polymerizations.
5. Some of my major research findings, as relevant to the subject matter of US patent application no. 10/587,653 ('the patent application'), are as follows:
  - A study of the reaction of various tertiary aromatic amines with diacyl peroxides demonstrating that N,N-bis(2-hydroxyethyl)-*p*-toluidine ("dihyto") exhibits optimal combination of kinetic properties, compatibility with droplet stability, and toxicological profile.
  - At ambient temperature, dihyto reacts rapidly with dibenzoyl peroxide to initiate polymerization, but at a negligible rate with dilauroyl peroxide, which needed a much higher temperature for reaction. This led to the idea of combining both peroxides to create a two stage initiating system. Thus, at peak exotherm, with the dibenzoyl peroxide exhausted, the temperature was sufficiently high for the dihyto to now react with dilauroyl peroxide, bringing about a late surge of initiating radicals to consume most of the residual monomers.
6. I am named as an inventor in the patent application.
7. I have been provided with and have reviewed a copy of the patent application and a copy of prior art documents US 6,533,967 and US 5,056,996 that I am informed have been cited against the patent application by the Examiner in the course of examination. I have been asked to provide general comments on the invention described in the patent application and background comments on the field to which it relates, as well as to provide comments on the disclosure of the cited prior art documents and their relevance, if any, to the invention described within the patent application.

#### **The patent application**

8. The patent application in general is directed to the manufacture of polyester granules crosslinked with styrene for use as matting agents and fillers in domestic paints. In this market, recent years have seen an increased emphasis on low odour products with

vanishingly low concentrations of potentially harmful volatile materials. Earlier products of this type had levels of residual styrene which are nowadays considered unacceptable. Free radical polymerizations do not normally proceed to the very high conversion required in domestic applications, and levels of residual monomers are typically reduced by "spiking" with one or more extra additions of fresh initiator once the initial initiator charge has been depleted. This traditional approach, however, is largely ineffective when the residual monomer is inside a hard, crosslinked particle that fresh initiators cannot easily enter. The key part of this invention, then, is the introduction of a novel two-stage initiating system, where both parts are present at the outset inside the developing particle, and which brings the levels of residual styrene down to unprecedented and acceptably low levels. Both stages rely on the reaction of a redox couple, here a tertiary aromatic amine and a diacyl peroxide, to provide the initiating radicals, but the use of two different diacyl peroxides with different rates of reaction ensures that the two redox reactions occur consecutively, and not concurrently: the polymerization initiated by the first (fast reacting) peroxide generates sufficient heat to cause the second (slow reacting) peroxide to react with excess amine and produce a late spike of initiating radicals to consume the bulk of the remaining monomers.

**Obviousness rejection**

9. I have been advised that the Examiner has rejected claims 16-18, 20-21, 23-24, 27, 30-31, 34-36 and 53 as being unpatentable over Ritchie *et al.* (US 6,533,967) in view of Papastavros *et al.* (US 5,056,996).
10. I comment on the prior art documents below.

US 6,533,967

11. The prior art of Ritchie *et al.* is concerned with the use of a particular class of tertiary aromatic amines as reductants for diacyl peroxides as a means to generate radicals for initiating crosslinking polymerization in styrene-polycarbonate droplets. The advantages of this class over other amines used previously in similar applications lie in their known superior toxicological profiles, and also in their fortuitous and unforeseen ability to reduce odour by a significant decrease in the amount of residual styrene. This invention deals specifically with single peroxides as the oxidising component of the redox couple. In contrast, the application of Such *et al.* adopts, with due citation,

the benefits of this class of amine reductants and applies it to a suitable mixture of two different diacyl peroxides for the reasons described in paragraph 8 above. As previously noted, the invention in Such *et al.* lies primarily in the use of two complementary diacyl peroxides in combination with the previously described amines, not the use of the previously described amines *per se*.

US 5,056,996

12. The prior art of Papastavros *et al.* applies to bulk polymerization in sandwiched sheets, as opposed to the aqueous dispersion-type polymerization aimed at pumpable slurries of fine particles described by Such *et al.* These two types of polymerization techniques have widely differing requirements and limitations. Among the most significant are the distribution of initiator with respect to monomer, the loci of initiation, and the temperature limits imposed by the reaction medium.
13. Papastavros *et al.* is primarily concerned with apparatus and its use and not the use of initiators, either solely or in combinations. They also provide no data nor discussion in any of their examples on any relationship between initiator use and unreacted monomers and odours therefrom. They seem to place no importance on this latter aspect, beyond a stated desired preference for general "efficient use of polymerization initiator and high degrees of polymerization".
14. In contrast, the problem with which Such *et al.* is concerned relates to minimising residual monomer in polyester granules prepared by suspension polymerization. The equipment, reagents, skill and knowledge to perform bulk polymerization as described in Papastavros *et al.* is vastly different to that required to perform the suspension polymerization that is the subject of Such *et al.* More specifically, it is well known that the distribution of initiator with respect to monomer, the loci of initiation, and the temperature limits imposed by the reaction medium for both bulk and suspension polymerization are vastly different. This can be appreciated by understanding that in bulk polymerization the polymerization reaction occurs throughout the entire reaction medium, whereas in suspension polymerization the reaction medium consists of monomer droplets suspended throughout a continuous aqueous phase and the polymerization reaction occurs only within the suspended monomer droplets. For at least these reasons, any technical know-how relating to one such technique is unlikely to, and in most cases will not, translate to the other. I am

therefore of the opinion that a person looking to address the problem of Such *et al.* would simply not consider Papastavros *et al.* as a source of potentially relevant technical information.

15. Nevertheless, there is discussion in Papastavros *et al.* relating to the use of initiator combinations, many of which I note are not even based on diacyl peroxide type initiators. The use of initiator combinations in Papastavros *et al.* seems to be concerned with how such combinations will help to maintain a reasonably constant concentration of radicals in the presence of excessive polymerization exotherms that cause premature depletion of initiator in the desired time frame of their production process. They deliberately choose initiator combinations with only a small temperature-dependent reactivity difference, with considerable cooling imposed by their apparatus, to maintain this constancy. Providing a constant concentration of radicals is simply not an objective of Such *et al.*
16. The use of cooling in Papastavros *et al.* also supports my comments in 14 above attesting to the differences between bulk polymerization and the suspension polymerization of Such *et al.* As a case in point, the suspension polymerizations of Such *et al.* simply do not require external cooling due to the fundamentally different mode of polymerization that occurs (see my comments in 14 above). This point serves to highlight in practical process terms a consequence of the fundamental differences between the two polymerization techniques. Achieving temperature stabilisation of the polymerization in Papastavros *et al.* requires entirely different consideration to, and entirely different process conditions and equipment from, the polymerization in Such *et al.*
17. In my opinion, the application, the medium, the mode and extent of use, and the intent behind Papastavros *et al.*'s use of initiator combinations are practically and technically removed from the work of Such *et al.* I do not consider Papastavros *et al.* to be relevant prior art. Ritchie *et al.* is also not considered relevant because it makes no reference at all to using complementary diacyl peroxide pairs. Furthermore, I would not be motivated in any way to combine the disclosure of Papastavros *et al.* with Ritchie *et al.* in order to solve the problem of Such *et al.* and thereby arrive at the claimed invention in that application. In particular, faced with developing a suspension polymerization process, I would not be drawn to the disclosure of Papastavros *et al.* due to its focus on bulk polymerization. In the event that I was to

review the document, alone or in combination with Ritchie *et al.*, there is nothing whatsoever in the disclosure(s) that would motivate me to select a particular mole ratio of two different diacyl peroxides (as required in Such *et al.*) over any one of the many other initiator combinations contemplated therein (most of which in any case are not in fact diacyl peroxides). Any teaching to use a combination of initiators in the context of bulk polymerization according to Papastavros *et al.* is, in my opinion, not practically or technically relevant to the suspension polymerization related problem with which in Such *et al.* is concerned.

I hereby declare that all statements made on my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the U.S. Code and may jeopardize the validity of the application or any patent issuing thereon.



Date: 30/01/2012

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Algirdas Kazimieras Serelis

## CURRICULUM VITAE

**Name:**

Algirdas Kazimieras SERELIS

**Business Address:**

DuluxGroup Ltd.  
Technology Centre,  
1956 Princes Highway  
CLAYTON, Vic., 3168  
Tel.: (03) 9263 3600  
Facsimile: (03) 9263 5730  
E-mail: algi.serelis@dulux.com.au

**Home Address:**

29 Cratloe Road,  
MOUNT WAVERLEY, Vic., 3149  
Tel.: (03) 9808 9191

E-mail: anjserelis@netpace.net.au

**Born:**

7 July, 1947, in Memmingen, West Germany, of Lithuanian parents

**Citizenship:**

Australian

**Present Occupation:**

Senior Research Specialist, Polymer Technology, The Technology Centre, DuluxGroup Ltd.

**Academic Qualifications:**

B.Sc., The University of Adelaide (completed 1969, conferred 1970)  
B.Sc., (Honours), The University of Adelaide (completed 1970, conferred 1971)  
Ph.D., The University of Adelaide (completed 1975, conferred 1976)

**Awards and Prizes:**

Way College Prize and Medal for Chemistry, 1963  
Commonwealth Tertiary Education Scholarship, 1965  
Commonwealth Postgraduate Research Award, 1971

**Professional Societies:**

Member, Royal Australian Chemical Institute (Treasurer, Organic Chemistry Group, Victorian Branch, 1985 - 2004)  
Member, American Chemical Society

**Summary of Research Achievements and Endeavours:**

- 1990 - present:** Senior Technical Officer - Senior Research Scientist, Dulux Research and Development, Polymer Technology Group (publications 26-28, 30-48; lectures 12-14)
- Development of crosslinking reactions in drying films from aqueous copolymer emulsions and elucidation of their mechanisms. Preparation of reactive emulsion polymers through incorporation of functional comonomers.
  - Development of tannin binding reagents and related mechanistic studies.
  - Conception and synthesis of novel additives for waterborne paints.

- Development of an amine-peroxide initiating system for high-conversion crosslinking of unsaturated polyesters with styrene. Resolution of chemical and process problems associated with the manufacture of solid polyester granules.
- Synthesis of catalysts and hydroxy-functional monomers for studies on cobalt catalysed chain transfer polymerization leading to aldehyde-terminated polymers.
- Development of a flexible and efficient synthesis of a novel subclass of Gemini surfactants and a practical method for laboratory scale polyethoxylation of alcohols.
- Synthesis of conventional as well as novel thiocarbonylthio compounds for conducting polymerizations by reversible addition-fragmentation chain transfer (RAFT). Preparation of self stabilizing latexes using RAFT (with the Key Centre for Polymers and Colloids at Sydney University; supported by Orica STF and ARC SPIRT grants).
- Coordinate the transition of Dulux's patented RAFT latex technology from laboratory to production. Ensure that processes will be sufficiently robust to permit scale-up, and that all safety and environmental matters are adequately addressed. Arrange all necessary testing for relevant materials to facilitate their registration process on AICS.
- Non-radical polymerization (olefin metathesis) of unconventional monomers mediated by organometallic species (with Monash University; supported by Orica STF and ARC SPIRT grants). Extend this methodology to plant-derived materials for development of a novel class of fast-drying low VOC enamel paints.
- Provide expert advice to Dulux R&D in matters pertaining to Organic Chemistry. Assist and advise in analytical problems, particularly involving interpretation of n.m.r. spectra. Liaise with and develop partnerships with academic collaborators in areas of chemistry of interest to Dulux activities.

**1987 - 1990:** Senior Research Fellow, Monash University, Department of Chemistry (publications 24, 25; lecture 11)

- Synthesis of crowded cyclic diesters as potentially thermolabile compounds *via* Diels-Alder chemistry or annulation of dialkyl succinate dianions.
- Conversion of morphine to analogues with polar N-substituents (with Pharmacology Department, Monash University).
- Synthesis and flash vacuum pyrolysis of 8-substituted naphthalene-1,2-dicarboxylic anhydrides.
- Synthesis of differentially N-substituted 1,4,7,10,15-pentaazabicyclo[5.5.5]heptadecanes

**1986 - 1987:** Senior Research Scientist, CSIRO Division of Applied Organic Chemistry, Process Chemistry (publication 29)

- Optimization of the synthesis of and alternate routes to 1-(4-ethoxyphenyl)-2,2,3,3-tetrafluorocyclobutanecarboxylic acid
- Demonstration of asymmetric induction in the cycloaddition of tetrafluoroethylene to chiral derivatives of 2-(4-ethoxyphenyl)acrylic acid

**1980 -1986:** Research Scientist - Senior Research Scientist, CSIRO Division of Applied Organic Chemistry, Polymer Chemistry (publications 13-15, 17-23; lectures 4-10)

- Radical trapping experiments with 1,1,3,3-tetramethylisoindolinoyl to reveal fine details in the reaction of methyl methacrylate and styrene with cumyloxy radicals.



- Study of the products and secondary products of self-reaction of a number of simple radicals as models for termination and subsequent processes in the polymerization of analogous monomers (methacrylonitrile, methacrylamide, styrene, various alkyl methacrylates). Radical generation was by thermal decomposition of diazenes (includes B.Sc.Hons. work of Snezna Bizilj and Philip Thompson).
- Simple radicals as models for the study of termination in the polymerization of acrylonitrile and acrylate esters could not be generated by thermolysis of appropriate secondary diazenes because these suffered tautomerization to hydrazones rather than radical formation. The desired radicals could be generated by photolysis of the diazenes, or by thermolysis of the analogous diacyl peroxides (includes B.Sc.Hons. work of Joanna Barry and Stefan Danek).
- Unsymmetrical diazenes were used for the pairwise generation of unlike radicals whose cross-reaction products modelled termination reactions in copolymerization (methyl methacrylate - butyl methacrylate; methyl methacrylate - styrene). Inclusion of radical scavengers allowed a distinction to be made between the reactions of geminate radical pairs and encounter radical pairs. Encounter pairs showed a distinct preference for cross-termination over homotermination (includes B.Sc. Hons. work of Philip Thompson).
- The mechanism of primary radical termination for AIBN-initiated styrene polymerization was also modelled using the unsymmetrical diazene technique.
- A mild, efficient, and stereocontrolled route to azonitriles (cyanodiazenes) was achieved by the stereospecific 1,4-*anti* -addition of chlorine to a ketazine, followed by the stepwise replacement of the two chlorines by cyanide with retention of configuration using trimethylsilyl cyanide (Ph.D. work of Stefan Danek)
- A novel route to more functionally complex diazenes was developed: saturation-induced ring closure of 3- or 4-carboxyhydrazones provided a novel route to N-aminolactams, which proved highly resistant to hydrolysis under acidic or basic conditions, but could be opened under mild oxidative conditions to afford 3- or 4-carboxy diazenes (in water) or the corresponding methyl esters (in methanol).

**1978 - 1980:** Research Fellow, University of Adelaide, Department of Organic Chemistry (publications 9-12, 16; lectures 1, 3)

- Studied kinetics and mechanisms of radical rearrangements and cyclizations.
- Measured rate of degenerate 3-butenyl radical rearrangement, which occurs *via* an intermediate cyclopropylcarbinyl radical, by deuterium n.m.r. of the products from *d*<sub>2</sub>-labelled substrates.
- Examination of the cyclization of a number of substituted 5-hexenyl radicals led to a model which explained the stereochemistry of the products and which proved to have wide applicability and predictive value.
- Various acyclic dienyl radicals were found to readily undergo two sequential cyclizations to generate products possessing bicyclo[2.2.1]heptane and bicyclo[3.3.0]octane ring systems.

**1975 - 1977:** NSF Postdoctoral Fellow, State University of New York at Buffalo, Department of Chemistry (publications 7,8; lecture 2)

- Studied acid-mediated cyclizations of allylic carbinols bearing proximate alkyne, allene, and chloro-olefin groups as a facile route to hydroazulenene ring systems.
- This cationic cyclization methodology was extended to provide an entry to the pseudoguaiane sesquiterpene skeleton, culminating in a total synthesis of damsinic acid.

- Investigation of the site of alkylation of dienolate anions of  $\alpha,\beta$ -unsaturated carbonyl compounds substituted at the  $\gamma$ -position with electron-withdrawing substituents as part of a program directed at forcing alkylation to occur at the  $\gamma$ -position.

**1970 - 1975:** B.Sc. Honours and Ph.D., University of Adelaide, Department of Organic Chemistry (publications 1-6)

- Kinetics of  $\pi$ -route solvolysis of unsaturated monocyclic compounds leading to bicyclic carbocations (8-hydrindanyl, 9-decalyl, and 2-*t*-butyl-9-decalyl cations).
- Quantitative determination of products of cation collapse involving proton loss or solvent capture and discussion of product control in terms of ion-pairing and structural and conformational factors in the carbocation.
- Synthesis of solvolysis substrates. Stereoselective synthesis of *t*-butyl substituted octahydronaphthalenes and decahydronaphthalenes.

**Teaching Experience:**

- 1977: Visiting Lecturer at the State University of New York at Buffalo teaching a one-semester equivalent course in General Organic Chemistry at second year level
- 1990: Fourth year lecture/tutorial course ("Spectroscopic Problems In Organic Chemistry") at Monash University
- 1987-1990: Occasional fill-in first year lectures at Monash University
- 1984-5, 1987-90: Conception, planning, and supervision of research carried by undergraduate, Honours, and Ph.D. students

**Publications and Patents:**

1. Gream, G.E.; Serelis, A.K. "The 9-decalyl and related cations. Part II: Acetolysis of 3-(2-methylenecyclohexyl)propyl derivatives." *Aust. J. Chem.*, **1974**, 27, 629.
2. Gream, G.E.; Serelis, A.K.; Stoneman, T.I. "The 9-decalyl and related cations. Part III: Generation of the 8-hydrindyl cation by solvolysis." *Aust. J. Chem.*, **1974**, 27, 1711.
3. Gream, G.E.; Laffer, M.H.; Serelis, A.K. "Acetolysis of *cis*- and *trans*-9-*t*-butylspiro[4.5]dec-6-yl *p*-toluenesulphonate." *Tetrahedron Lett.*, **1975**, 4713.
4. Gream, G.E.; Laffer, M.H.; Serelis, A.K. "The synthesis of some *t*-butyloctahydronaphthalenes." *Aust. J. Chem.*, **1978**, 31, 803.
5. Gream, G.E.; Laffer, M.H.; Serelis, A.K. "The 9-decalyl and related cations. Part IV: Generation of *cis*- and *trans*-2-*t*-butyl-9-decalyl cations through  $\sigma$ -routes by acetolysis." *Aust. J. Chem.*, **1978**, 31, 835.
6. Gream, G.E.; Serelis, A.K. "The 9-decalyl and related cations. Part V: Generation of *cis*- and *trans*-2-*t*-butyl-9-decalyl cations through  $\pi$ -routes by acetolysis." *Aust. J. Chem.*, **1978**, 31, 863.
7. Lansbury, P.T.; Serelis, A.K. "A facile entry to pseudoguaianes. Total synthesis of damsinic acid." *Tetrahedron Lett.*, **1978**, 1909.
8. Lansbury, P.T.; Serelis, A.K.; Hengeveld, J.E.; Hangauer, D.G. "Total synthesis of pseudoguaianes. Part I: Preparation of bicyclo[5.3.0]decane synthons for damsinic acid and helenanolides." *Tetrahedron*, **1980**, 36, 2701.
9. Effio, A.; Griller, D.; Ingold, K.U.; Beckwith, A.L.J.; Serelis, A.K. "Allylcarbinyl-cyclopropyl-carbinyl rearrangement." *J. Amer. Chem. Soc.*, **1980**, 102, 1734.
10. Beckwith, A.L.J.; Easton, C.J.; Serelis, A.K. "Some guidelines for radical reactions." *J. Chem. Soc., Chem. Commun.*, **1980**, 482.
11. Beckwith, A.L.J.; Lawrence, T.; and Serelis, A.K. "Stereoselectivity of ring closure of substituted hex-5-enyl radicals." *J. Chem. Soc., Chem. Commun.*, **1980**, 484.
12. Beckwith, A.L.J.; Phillipou, G.; and Serelis, A.K. "Formation of some bicyclic systems by radical ring closure." *Tetrahedron Lett.*, **1981**, 22, 2811.
13. Rizzardo, E.; Serelis, A.K.; Solomon, D.H. "Initiation mechanisms in radical polymerizations: Reaction of cumyloxy radicals with methyl methacrylate and styrene." *Aust. J. Chem.*, **1982**, 35, 2013.
14. Serelis, A.K.; Solomon, D.H. "The termination mechanism for radical oligomerization of methacrylonitrile." *Polymer Bull.*, **1982**, 7, 39.

15. Solomon, D.H.; Cuthbertson, M.J.; Griffiths, P.G.; Hawthorne, D.G.; Moad, G.; Rizzardo, E.; Serelis, A.K. "New studies on the structural irregularities of common vinyl polymers." *Proc. IUPAC, I.U.P.A.C., Macromol. Symp.*, 28<sup>th</sup> (1982), 116.; CAN 99:122996 AN 1983:522996
16. Beckwith, A.L.J.; Easton, C.J.; Lawrence, T.; Serelis, A.K. "Reactions of methyl-substituted hex-5-enyl and pent-4-enyl radicals." *Aust. J. Chem.*, **1983**, 36, 545.
17. Moad, G.; Serelis, A.K.; Solomon, D.H.; Spurling, T.H. "On the relative importance of cross- and homoterminal in radical copolymerization." *Polymer Comm.*, **1984**, 25, 240.
18. Cacioli, P.; Moad, G.; Rizzardo, E.; Serelis, A.K.; Solomon, D.H., "The use of model compounds in interpreting the thermal degradation of poly(methyl methacrylate). Effect of groups produced during termination of polymerization." *Polymer Bull.*, **1984**, 11, 325.
19. Bizilj, S.; Kelly, D.P.; Serelis, A.K.; Solomon, D.H.; White, K.E. "The self-reaction of 1-methoxycarbonyl-1-methylethyl and higher ester radicals: Combination vs disproportionation and oligomeric products from secondary reactions." *Aust. J. Chem.*, **1985**, 38, 1657.
20. Kelly, D.P.; Serelis, A.K.; Solomon, D.H.; Thompson, P.E. "The cross-reaction between 1-methoxycarbonyl- and 1-butoxycarbonyl-1-methylethyl: Simultaneous generation of unlike radicals from an unsymmetrical azo precursor." *Aust. J. Chem.*, **1987**, 40, 1631.
21. Danek, S.K.; Kelly, D.P.; Serelis, A.K.; Steel, P.J. "A stereospecific synthesis of azonitriles." *J. Org. Chem.*, **1987**, 52, 2911.
22. Schreck, V.A.; Serelis, A.K.; and Solomon, D.H. "Self-reactions of 1,3-diphenylpropyl and 1,3,5-triphenylpentyl radicals: Models for termination in styrene polymerization." *Aust. J. Chem.*, **1989**, 42, 375.
23. Serelis, A.K.; Solomon, D.H.; Steel, P.J. "Stereospecificity in the geminate recombination of 1,3-diphenylpropyl radical pairs." *Aust. J. Chem.*, **1989**, 42, 395.
24. Rae, I.D.; Serelis, A.K. "Dimethyl *cis*- and *trans*-1,2-dimethylcyclohexane-1,2-dicarboxylate." *Aust. J. Chem.*, **1990**, 43, 1941.
25. Jackson, W.R.; Copp, F.C.; Cullen, J.D.; Guyett, F.J.; Rae, I.D.; Robinson, A.J.; Pothoulackis, H.; Serelis, A.K.; Wong, M. "Chemical design of peripherally acting compounds." *Clinical and Experimental Pharmacology and Physiology*, **1992**, 19, 17.
26. Banwell, M.G.; Hamel, E.; Ireland, N.K.; Serelis, A.K. "Studies directed towards total syntheses of the Tropoloisoquinoline alkaloids grandirubrine and imerubrine. Part 2. Thermolysis of 8,9-dihydro-2-hydroxy-3,10,11,12-tetramethoxyisoquinolo[2,1-c][1,2,3]benzotriazin-7-ium chloride. Competitive modes of cyclisation leading to the indeno[1,2,3-*ij*]isoquinoline (azafluoranthene) skeleton." *J. Chem. Soc., Perkin Trans. 1*, **1993**, 1905.

27. Serelis, A.K.; Paravagna, O.M.; Leary, B. "Waterborne crosslinkable coatings using aminoalkylalkoxysilane crosslinked acetoacetate functional binder." PCT Int. Appl. (1995), WO 9509208 A1; CAN 123:231406.
28. Serelis, A.K.; Meekings, C.D. "Waterborne crosslinkable coatings using polyoxyalkylene polyamine crosslinked acetoacetate functional binder." PCT Int. Appl. (1995), WO 9509209 A1; CAN 123:259894.
29. Serelis, A.K.; Simpson, G.W. "Stereoselectivity in the thermal cycloaddition reactions of tetrafluoroethylene to derivatives of  $\alpha$ -(4-ethoxyphenyl)acrylic acid." *Tetrahedron Lett.*, **1997**, 38, 4277.
30. Ritchie, P.J.A.; Serelis, A.K.; Leary, B. "Initiating system for solid polyester granule manufacture." PCT Int. Appl. (2000), WO 2000043425 A1; CAN 133:121113
31. Ferguson, C.J.; Hughes, R.J.; Pham, B.T.T.; Hawket, B.S.; Gilbert, R.G.; Serelis, A.K.; Such, C.H. "Effective ab initio emulsion polymerization under RAFT control." *Macromolecules*, **2002**, 35, 9243
32. Ritchie, P.J.A.; Serelis, A.K. "Vesiculated polyester granules." U.S. Pat. Appl. Publ. (2003), US 2003040557 A1; CAN 138:188668
33. Such, C.H.; Rizzardo, E.; Serelis, A.K.; Hawket, B.S.; Gilbert, R.G.; Ferguson, C.J.; Hughes, R.J. "Aqueous dispersions of polymer particles." PCT Int. Appl. (2003), WO 2003055919 A1; CAN 139:101540
34. Pham, B.T.; T.; Nguyen, D.; Ferguson, C.J.; Hawket, B.S.; Serelis, A.K.; Such, C.H. "Miniemulsion polymerization stabilized by amphipathic macro RAFT agents." *Macromolecules*, **2003**, 36, 8907
35. Patel, J.; Jackson, W.R.; Serelis, A.K. "A structurally characterized ruthenium bis(pyrazolyl)borate benzylidene complex containing an agostic Ru-H-C interaction: synthesis and catalytic activity." *Inorganica Chimica Acta*, **2004**, 357, 2374
36. FitzGerald, P.A.; Carr, M.W.; Davey, T.W.; Serelis, A.K.; Such, C.H.; Warr, G.G. "Preparation and dilute solution properties of model gemini nonionic surfactants." *J. Colloid Interface Sci.*, **2004**, 275, 649
37. Ferguson, C.J.; Hughes, R.J.; Nguyen, D.; Pham, B.T.T.; Gilbert, R.G.; Serelis, A.K.; Such, C.H.; Hawket, B.S. "Ab initio emulsion polymerization by RAFT-controlled self-assembly." *Macromolecules*, **2005**, 38, 2191
38. Such, C.H.; Henry, C.; Czapski, B.A.; Seligman, K.L.; Ajinkya, D.; Serelis, A.K. "Initiating system for suspension polymerization, solid polyester granule manufacture, and paints." PCT Int. Appl. (2005), WO 2005073257 A1; CAN 143:195295
39. Patel, J.; Elaridi, J.; Jackson, W.R.; Robinson, A.J.; Serelis, A.K.; Such, C. "Cross-metathesis of unsaturated natural oils with 2-butene. High conversion and productive catalyst turnovers." *Chem. Commun.*, **2005**, 5546

40. Sprong, E.L.; Leswin, J.S.K.; Lamb, D.J.; Ferguson, C.J.; Hawket, B.S.; Pham, B.T.T.; Nguyen, D.; Such, C.H.; Serelis, A.K.; Gilbert, R.G. "Molecular watchmaking: ab initio emulsion polymerization by RAFT-controlled self-assembly." *Macromol. Symp.*, **2006**, *231*, 84
41. Patel, J.; Mujcinovic, S.; Jackson, W.R.; Robinson, A.J.; Serelis, A.K.; Such, C. "High conversion and productive catalyst turnovers in cross-metathesis reactions of natural oils with 2-butene." *Green Chem.*, **2006**, *8*, 450
42. Such, C.H.; Patel, J.; Jackson, W.R.; Robinson, A.J.; Serelis, A.K. "Crosslinking method." PCT Int. Appl. (2007), WO 2007002999 A1, CAN 146:122596
43. Alb, A.M.; Serelis, A.K.; Reed, W.F. "Kinetic trends in RAFT homopolymerization from online monitoring." *Macromolecules*, **2008**, *41*, 332
44. Nguyen, D.; Zondanos, H.S.; Farrugia, J.M.; Serelis, A.K.; Such, C.H.; Hawket, B.S. "Pigment encapsulation by emulsion polymerisation using macro-RAFT copolymers." *Langmuir*, **2008**, *24*, 2140
45. Li, Z.; Serelis, A.K.; Reed, W.F.; Alb, A. "Deviations from livingness during gradient copolymerization by RAFT." *Polymer Preprints*, **2010**, *51(1)*, 84
46. Li, Z.; Serelis, A.K.; Reed, W.F.; Alb, A. "Toward amphiphilic diblock copolymers by RAFT. Kinetic study on pH responsive polymers." *Polymer Preprints*, **2010**, *51(1)*, 476
47. Li, Z.; Serelis, A.K.; Reed, W.F.; Alb, A. "Online monitoring of the copolymerization of 2-(dimethylamino)ethyl acrylate with styrene by RAFT. Deviations from reaction control." *Polymer*, **2010**, *51*, 4726
48. Serelis, A.K. "Athelstan L.J. Beckwith and the flowering of hex-5-enyl radical cyclization chemistry. The Adelaide years." *Aust. J. Chem.*, **2011**, *64*, 358

**External Lectures:**

1. "Cyclizations of dienyl radicals."  
RACI, Division of Organic Chemistry, 5th National Conference, University of Tasmania, January 14-18 (15), 1979.
2. "A facile entry to pseudoguaianes: Total synthesis of damsinic acid."  
University of Sydney, Department of Organic Chemistry, invited lecture, June 4, 1980.
3. "Some aspects of radical cyclizations."  
University of Melbourne, Department of Organic Chemistry, invited lecture, July 10, 1981.
4. "Model studies on termination in radical polymerization."  
RACI, 7th National Convention (Polymer Division, 13th Australian Polymer Symposium), Australian National University, August 22-27 (27), 1982.
5. "Model studies on termination in radical polymerization."  
Monash University, Department of Organic Chemistry, invited lecture, October 19, 1983.
6. "Model studies on termination in radical polymerization."  
Australian Polymer Discussion Group, Australian National University, November 22-25 (24), 1983.
7. "The mechanism of primary radical termination in AIBN-initiated styrene polymerization."  
RACI, Polymer Division, 14th Australian Polymer Symposium, Ballarat, February 12-16 (15), 1984.
8. "Model studies on termination in radical polymerization."  
University of Melbourne, Department of Organic Chemistry, invited lecture, July 20, 1984.
9. "Routes to complex azoalkanes."  
RACI, Victorian Branch, Organic Chemistry Group, 9th Annual Synthesis Symposium, University of Melbourne, December 6, 1984.
10. "Oxidative ring-opening of N-aminolactams: A route to  $\omega$ -carboxydiazenes"  
RACI, Division of Organic Chemistry, 9th National Conference, University of Adelaide, May 11-15 (12), 1986.
11. "Design of drugs able to cross the blood-brain barrier."  
ANCA-CSIRO Workshop on Development of an Australian Antiviral Industry for AIDS, Australian National University, November 24-25 (25), 1988.
12. "Crosslinkable microparticle latexes."  
ICI Australia Synthesis and Process Organic Chemistry Symposium, ICI Central Research Laboratories, Ascot Vale, August 21, 1992.
13. "Surfactant effects in pigmented solid Spindrift beads"  
Orica Technical Symposium, Ascot Vale, March 28, 2000.

14. "New directions in the chemistry of waterborne paints"  
RACI ACT branch, invited lecture at the Australian National University, Research School of Chemistry, August 15, 2002.



**Referees:**

Professor A.L.J. Beckwith,  
Research School of Chemistry,  
Australian National University,  
PO Box 4,  
CANBERRA, A.C.T., 2600.  
Tel.: (06) 249 3234  
Facsimile: (06) 249 5995  
E-mail: [beckwith@rsc.anu.edu.au](mailto:beckwith@rsc.anu.edu.au)

Professor W.R. Jackson,  
Chemistry Department,  
Monash University,  
CLAYTON, Vic., 3168  
Tel.: (03) 9565 4552  
Facsimile: (03) 9565 4597  
E-mail: [w.r.jackson@sci.monash.edu.au](mailto:w.r.jackson@sci.monash.edu.au)

Professor M.G. Banwell,  
Research School of Chemistry,  
Australian National University,  
PO Box 4,  
CANBERRA, A.C.T., 2600.  
Tel.: (06) 279 8202  
Facsimile: (06) 249 5995  
E-mail: [mgb@rsc.anu.edu.au](mailto:mgb@rsc.anu.edu.au)

Mr. C.H. Such  
Dulux Australia  
Research and Development Laboratories  
PO Box 60,  
CLAYTON SOUTH, Vic., 3169  
Tel.: (03) 9263 5047  
Facsimile: (03) 9263 5730  
E-mail: [chris.such@orica.com](mailto:chris.such@orica.com)